perature rather high, the roots probably absorbed a certain quantity of water which was unable to escape in proportionate amounts, because of the absence of transpiring leaves. In this way a large amount of water might have accumulated in the root system and trunk. Of the roots, those growing in the water have the thinnest walls, both in the epidermis and cortex, and when the tension became too great, elongation of the subepidermal cells took place. All roots in the water had cushions more or less developed, while the soil roots failed to show them. No indications of any œdematous structures were to be found in the branches.—HERMANN VON SCHRENK, *Shaw School of Botany, St. Louis.*

ON THE PRESENCE AND LOCALIZATION IN CERTAIN POMACEOUS SEEDS OF THE PRINCIPLES PRODUCING CYANHYDRIC ACID.

IT is well known that certain of the Amygdalaceæ contain two principles which in their reaction upon each other in the presence of water produce cyanhydric acid. These two principles are *emulsin*, a ferment, and *amygdalin*, a glucoside. The amygdalin and emulsin occur in different cells in the plants which contain them, so that laceration of tissues is necessary for production of cyanhydric acid. It is not the Amygdalaceæ alone that contain the principles that generate cyanhydric acid, but they are to be found in many plants of different families.

Kobert,[1] who gives a very complete enumeration of such plants, mentions the seeds of *Malus communis* as containing emulsin and amygdalin. He does not insist upon the presence of these substances in apple seeds, and does not mention any other of the Pomaceæ. It seemed well, therefore, to extend the investigation throughout the group. To determine the presence of the generative principles of cyanhydric acid in pomaceous seeds I followed the classical experiments for the determination of this acid, and the methods employed by M. L. Guignard in his earlier investigations of this subject.

1. The seeds are crushed in a glass mortar in a small amount of water, and tested as to a development of the odor of bitter almonds.

2. The product is diluted in a larger amount of water and distilled in a glass retort. The first portions of the liquid passing over in dis-

[1] Lehrbuch der Intoxicationen 510.

tillation are collected, and tested with silver cyanide, isopurpurate (hot potassium and picric acid), and ammonium sulfocyanide. The action of the isopurpurate is especially characteristic.

3. If these tests give negative results, it may be due to the absence of one of the generative principles. It is well, therefore, to repeat the experiments upon the seeds, crushing them in the presence of amygdalin and emulsin successively.

As a result of such experiments I am able to make the following statements:

1. Amygdalin and emulsin exist together in the seeds of *Malus communis*, *Cydonia vulgaris*, *C. Japonica*, *Sorbus Aucuparia*, and *S. Aria*.

2. They do not occur together in the seeds of *Pirus communis*, *Cratægus oxyacantha*, *C. Azarolus*, and *Mespilus Germanica*.

The localization of emulsin and amygdalin in pomaceous seeds is difficult on account of the very small amounts in which they occur.

Emulsin.—This substance can be localized in these seeds only by the reagent of Millon. The other tests for proteids and ferments give only negative or doubtful results. The reagent acts very slowly. Place upon a slide a drop of Millon's reagent diluted to one-fourth or one-fifth by water acidulated with nitric acid. In this mount the sections to be tested, and heat so that for at least seven or eight minutes nearly a boiling temperature may be obtained. The sections become rose-colored, at first exceedingly pale, but gradually deepening. When the color is quite uniform throughout, and the temperature is nearly that of boiling, the preparation is cooled and examined. The cells containing the emulsin are stained brown, all other cells being pale rose color. In this manner I have demonstrated that the emulsin occurs in numerous cells scattered through the parenchyma of the cotyledons, and especially in the vicinity of woody bundles, whose endodermis likewise contains it. It is entirely lacking, however, in the external palisade cells. The hypocotyl, plumule, and root do not contain it, a fact that can be further demonstrated by detaching these regions and crushing them in a small quantity of amygdalin, when there is not developed the odor of almonds.

Amygdalin.—Precise localization of this glucoside is impossible on account of its very minute quantity, which baffles the most delicate tests. It may be stated, however, (1) that this substance occurs in the cotyledons, since they contain the emulsin and by crushing develop

cyanhydric acid; (2) that it exists in the hypocotyl, plumule, and root, since when these organs are detached from the cotyledons and crushed in a fresh solution of emulsin the odor of bitter almonds is developed.

Finally, I have proved that germination does not change the localization of these two substances. The emulsin, in particular, does not change its position in the seedling, or only after having undergone certain changes which modify its nature and properties.—M. L. LUTZ, *Paris*.

SYNONYMY OF MUCILAGO SPONGIOSA (Leys.).

THE earliest reference to any form of Myxomycetes appears in a citation by Haller from "Phil. Bonanni, Recreationes mentis & oculis, Rom. anno 1684." Its synonymy may be presented in the order of time as follows:

1. *Mucilago filamentosa ramosa* Bonanni, Recreationes 1684.
2. *Mucilago crustacea alba* Micheli, Nov. Pl. Gen. 1729; Battarra, Fung. Hist. 1755.
3. *Mucilago crustacea alba*, α. β. γ. Haller, Eu. Stirp. Helv. 1742.
4. *Mucor crustaceus, spongiam simulans, cortice in pulverem fatiscente* Gleditsch, Meth. Fung. 1753.
5. *Mucilago.* Adanson, Fam. des Pl. 1763.
6. *Mucilago alba, crustacea & filamentosa*, α. β. γ. Haller, Hist. Stirp. Helv. 1768.
7. *Byssus bombycina* Retzius, Act. Holm. 1769.
8. *Byssus floccosa* Schreber, Spic. Lips. 1771.
9. *Mucor spongiosus* Leysser, Fl. Hal. 1783.
10. *Mucilago crustacea* Schrank, Bay. Fl. 1789.
11. *Reticularia alba* Bulliard, Champ. 1791.
12. *Spumaria mucilago* Gmelin, Syst. Veg. 1791.
13. *Reticularia ovata*, var. Withering, Bot. Arr. 1792.
14. *Spumaria cornuta* Schumacher, Eu. Pl. 1803.
15. *Spumaria alba* De Candolle, Fl. Fr. 1805.

In no. 6, as in no. 3, Haller's species is much more extensive than in the synonymy elsewhere; it includes three of Micheli's species which he considers all forms or varieties of one. The second form, "*β. Mucilago alba, ramosa, radices arborum simulans* Micheli, p. 216, *t. 96, f. 3*" is considered by Fries to be a representation of the plasmodium of some species; it is under this form the citation from